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The Interaction between the tuna fishing operation and sea turtles issue in Viet Nam

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ABSTRACT

Principally, the fisheries sector has developed greatly and taken more important role in Viet Nam. However, a number of turtles have incident been killed during fishing activities. The purposes of this paper is primary assement on the interaction and options of reducing sea turtle mortality in tuna fishing and other operation. Some prevailing methodologies have been used to gather information concerned, such as: annually scientific reports on national fisheries resource management, field observer's survey, questionnaires and logbook collections...The sea turtle and tuna research program has being implemented in collecting of data of species composition, regional and seasonal distribution in Vietnamese seawaters. There has been identified 10 tuna species, which landing of the annually total yield of 30-40 thousands tones. The favour tuna species are catching by purse seiner, longline. The valuable tuna and other-like those targeting tuna species, which have a distribution that overlaps in the migration routes and feeding grounds of 5 turtle species. There is some provincial information involved to sea turtles as accidental catchments and caused killing sea turtles by J-hook style that almost tuna fishing boats have being used. This paper is also discussed the ration of other kind of fishing gears, use of new kinds of hook as circle hook and smarter fishing which can help to prevent sea turtles mortality from by-catch. The current interest of Viet Nam, through the Ministry of Fisheries (MoFI), is promoting the suitable exploitation, especially, tuna resource and sustainable conservation of sea turtle resources.

KEYWORDS: Sea turtle, mortality, tuna, logbook, purse seiner, longline, J-hook, circle hook, by-catch.

INTRODUCTION

Viet Nam is located in the west coastal Pacific Ocean. Together with its great potential in natural resources, it has been assessed as having the highest biodiversity waters in the world. The Viet Nam coast has a diverse range of habitats, ranging from the coral reefs, seagrass meadows, large areas of mangroves and several beautifully beaches. It has denoted more than one million square kilometers as an Exclusive Economical Zone (EEZ). These are continental areas under Viet Nam sovereignty, which could provide a broad benefit to local people. Those natural resources are originally safekeeping to prevent the starving and poverty matters if they are good managed. Principally, the fisheries sector has developed greatly and taken a more and more important role in the national economy [MoFI, 2004].

Total marine fishing production in the year of 2003 reached 1,426,000 tones, over 40% of which were for domestic consumption, 28% for export and around 30% for other purposes. There are at least 2,150 of fish species which have been identified in Viet Nam seawaters with high-economic values,

which could provide great protein sources for people [MoFI, 2004].

*Table 1: Total fisheries production of Viet Nam
(1991-2003)*

Year	Total Fish Product (Tone)	Marine Capture (Tone)	Aquatic culture (Tone)
1991	1,062,163	714,253	347,190
2000	2,003,700	1,280,590	723,110
2001	2,226,900	1,347,800	879,100
2002	2,410,900	1,434,800	976,100
2003	2,536,000	1,426,000	1,110,000

Research for marine resources in Viet Nam has been being carried out since the early 20th century and significant results have been gained: i) to investigate the suitable fishing grounds for nearshore pelagic fishing gears in the Tonkin Gulf, ii) to study the biological characteristics of some high-value pelagic fish species like herring, scads; iii) to study the distribution, quantity and the variation of fish eggs and larvae; iv) to investigate

the oceanographic conditions: meteorological characteristics, aquatic living resources; v) to determine a scientific basis for pelagic fishing Chu tien Vinh & Tran Dinh 1995].

Result, assessment on species composition, commercial fisheries composition and total catchments (CPU) of marine fisheries in Viet Nam have been analyzed [Nguyen Long *et al*, 1999].

However, a number of turtles have incidentally been killed during fishing activities. Awareness among Government employees, fishermen and the general public about sea turtle and the need to protect them is lacking in Vietnam. Before any conservation can be effective, these stakeholder groups must be aware that sea turtle conservation is important and how they can help

OBJECTIVES

- The consideration of fishing gears and their interaction with sea turtles, especially in tuna fishing operation.
- The options of reducing sea turtle mortality in Viet Nam.

METHODOLOGIES:

- Annual scientific reports on national fisheries resource management.
- Research results of involved sectors and institutions.
- Field observer's survey and logbook collections
- Circulated questionnaires and feedback answers
- Local Fishery Department submissions and information.
- Observation at local sites and markets.
- Newspapers, Magazine, internet information references...

RESULTS AND DISCUSSION

1. Some fishing gears impacted to sea turtles resources in Viet Nam.

By 2004, while the number of artisan vessels has remained similar, the number of registered vessels had increased to 90,088. Most of these (83,000) fish in the coastal zones. These registered vessels are using different kinds of nets:

- 42.3% are registered as bottom trawler nets
- 12.3% are registered as purse-seining nets
- 19.2% are registered as gill nets
- 7.0% are registered as lift netting gears
- 14.2% are registered as longline nets
- 5.0% are registered as other nets.

As a result of mismanagement, unwise exploitation, use of destructive fishing gear and illegal fish hunting cause sea turtle reduction, vulnerable marine environment and damaged marine ecosystems.

It reorganized that marine fisheries resources are going to overexploit due to the fishing boat

increasing the capacity both engine power and number. MoFI had planned the short and long term fisheries resource enhancement, especially, nearshore fisheries operation since 1999. It focused on some issues, including:

- Develop marine ranching and mitigate destructive fishing activities;
- Promote artificial hatcheries and aquaculture some high economical values to provide forward moderating both domestic and foreign markets.

2. Tuna fisheries operation:

The tuna research program was implemented in 1992 and since then has been collecting data of species composition, regional and seasonal distribution of tuna in Vietnamese seawaters [Pham Quoc Huy & Tran Dinh, 2002].

It is considered that great tuna resources exist in Viet Nam seawaters. 10 tuna species have been identified, including 2 tuna species with high economic value.

Those species are the major target in terms of the offshore fisheries operation which brings in a total annual yield of more than 40 thousands tonnes [Dao Manh Son *et al*, 2004].

The most important tuna species are Bigeyes (*Thunnus obesus*) and Yellowfin (*Thunnus albacares*). Additionally, other favourite tuna species, such as Kawakawa tuna (*Euthunnus affinis*), Frigate tuna (*Auxis thazard*), Bullet tuna (*Auxis rochei*), Skipjack tuna (*Katsuwonus pennis*) ... are caught by purse seiner, longline, gillnet and driftnet.

The tuna fisheries activities have been started by some fishermen at Phu Yen, Binh Thuan provinces since 1994. Those experiences then had been transferred and learnt each other by locals from Phu Yen to Quang Nam provinces. Our study results showed that major species of prey found in the stomach of the tuna were small shrimp; anchovies; scad; other small pelagic species, crustacean and; cephalopod. For catching tuna, common bait are the Oceanic Squid (*Symplectoteuthis oualaniensis*) or Purleback Flying Squid (*Sthenoteuthis oualaniensis*) [Tran Chu, 2001] and Herring/sardine (*Dactylopteridae*). Another reason for the acceleration of tuna fisheries, is the offered the price. It has been increasing 10% annually from \$VN 5-6 thousand (1994) up to \$VN 74 thousand (2004) per kg of fresh tuna products.

Therefore, the offshore fisheries encouragement program was launched by MoFI in 1999. Its objectives are to reduce nearshore fisheries pressures and enhance the operation at deep seawater fishing as well as marine environmental protection [MoFI, 2004].

3. Assessment on tuna distribution and season.

Tuna schools appear annually as a pelagic migratory stock at mid-level and deep level in Viet Nam seawaters. Many local boats actively follow and hunt the tuna.

At least 10 of the 54 tuna species, belonging to the tuna family (*Scombridae*) are distributed around Viet Nam. Those species are usually major yield in several hauls of achieved captures, annually. In previous years, some study projects on seasonal, biological characteristics and resource of tuna had been conducted.

Table 2: Some key tuna species distribution in Viet Nam seawaters

Scientific Name	Vietnamese Name	English Name	Distribution Areas
1. <i>Auxis thazard</i>	Ca Ngu Chu	Frigate tuna	They appeared at nearshore and offshore seawaters of Viet Nam.
2. <i>Auxis rochei</i>	Ca Ngu O	Bullet tuna	They found at Central and East-Southern but rarely at the Tonkin Gulf and the Gulf of Thailand.
3. <i>Euthunnus affinis</i>	Ca Ngu Cham	Kawakawa tuna	Distributed from the Tonkin Gulf to the Gulf of Thailand.
4. <i>Thunnus tongol</i>	Ca Ngu Bo	Longtail tuna	They separated at several seawaters but found broad at Central with big school.
5. <i>Sarda orientalis</i>	Ca Ngu Soc Dua	Striped bonito tuna	They found at Central but rarely at the Tonkin Gulf and the Gulf of Thailand.
6. <i>Katsuwonus pellenis</i>	Ca Ngu Van	Skipjack tuna	Separated at several seawaters but found broad at Central.
7. <i>Thunnus albacares</i>	Ca Ngu Vay Vang	Yellow fin tuna	They found at Central and East Southern, especially within the Khanh Hoa seawater
8. <i>Thunnus obesus</i>	Ca Ngu Mat To	Big eyes tuna	They distributed at 120-130m of depth at Central and East Southern.
9. <i>Thunnus alalunga</i>	Ca Ngu vay nguc dai		They distributed at 120-130m of depth at Central and East Southern.
10. <i>Thunnus orientalis</i>	Ca Ngu Vay xanh	Bluefin tuna (pacific)	They distributed at 140-150m of depth at Central but they are very rare.

Tuna schools become known in Viet Nam seawaters at beginning of January till February, annually. This event is less or more relative to “ Warm water current of Kuroshio”. Those schools voyaged into South China Sea and then separated into sub-schools, the first moved Northern upward, second one migrated Southern downward. However, most of them resided at the Central seawaters. Another tuna school existed in the Gulf of Thailand, which came from Southern direction.

The concentrated tuna fishing grounds are at the central seawaters of Viet Nam, tuna schools appeared in February-March and stimulated at Binh Dinh, Phu Yen, Khanh Hoa and Ba Ria-Vung Tau provinces. Since September-October, they had moved also downward South. However, in the Gulf of Thailand, tuna schools had appeared from March till November [Ha Yen, 2005].

The pelagic fishery resources in the central and southeastern seawaters contain an estimated yield of 1.16 million tonnes with an MSY of 405 thousand tonne. The first pelagical fishery is tuna group consists of 65% of which Skipjack tuna (*Katsuwonus pellenis*) 54%; Yellow fin tuna (*Thunnus albacares*) and Big eyes tuna (*Thunnus obesus*) cover 3.9%. Others cover 35%. In case of the tuna group could be annually exploited a feasible yield with 670,600 tones. However, in 2004, there were caught approximate 50,000 tones of which 24,500 tones were exported and got a revenue of \$US 54 million from traditional markets, which names US America, Japan, Australia, New Zealand, Taiwan, Israel, Germany, Slovakia, Spain...

4. Current tuna exploitation status and available techniques:

Several kinds of fishing gear have been used to catch tuna, they are:

- Purse seine netting operation: with some 4,596 fishing boats operating in tuna catchments. Their fishing gears included: purse seine with big mesh-size and purse seines by small mesh-size installed lead weightline accompany electric lights. There are a ratio of 40% of total of those fishing boat are less than 90CV engines.

- Drift/gill-netting exploitation: with some 15,578 boats fishing for tuna together with mackerel (*Scombridae*), sardines (*Clupeidae*) and flying-gurnards (*Dactylopteridae*). More than 90% of these fishing boats have engines less than 90CV..

- Longline netting captures: with some 16,150 fishing boats operated in tuna catchments. Their fishing gear includes multi-hook layer and single-hook. About 92% of the total fishing boats have engines less than 90CV.

The fishing operation draw out the year-round, exception of daily storms or typhoon. However, fishing days are quite short terms of approximate

15-20 days. Because of low engine power of those boats and their ice-stored cabinets were still not enough. Additionally, the product preserved techniques are being effectiveness. In facts, they are many fishing boats intending to exploit at offshore waters, especially, some of vessels, which were operating unsuccessfully at nearshore, are shifting into catchments of tuna at deep seawaters.

In case of Phu Yen province, the year of 2003 statistics recorded amount of 400 tuna fishing boats, but at the end of 2004, there were more than 700 ones [The Agricultural on-line internet of Viet Nam, 2004; Phan The Huu Toan, 2004]. However, those mismanaged acceleration is able to impact negatively on tuna resources as well as its CPU (catch per unit) in near future.

In connection to tuna caught techniques are following traditional experiences in Viet Nam. The local fishermen liked modifying gears and applying the modern technique in terms of tuna fishing operation. However, it seem to be impossible due to gap funding sources. Therefore, some big tuna school escaped or captured a little ones.

The deep water layers for fishing are different, depending on tuna species, season and location. Additionally, the tuna fishing grounds mainly limited certain depth while boats equipped with low engine power and traditional fishing gears, are not easy to perfect take. Furthermore, the observation and looking for tuna school often based on the local fishermen's experiences at some focused seawaters in Viet Nam.

All the way through the fisheries management mechanism is still fragile and traditional techniques but tuna products are increasing year by year as well as shifting coastal fisheries into offshore fishing operation. Since 1996, the annual statistical figures showed that Skipjack, Yellowfin and Bigeye Tuna have been the main targets with total catchments at a stable level of 30-31 thousand tones/year. These yields were landed mainly in central and southern seawaters of Viet Nam [Dao Manh Son *et al*, 2004].

It recognized that the really tuna yield could be captured higher yet. According to some quick surveys (using RRA methods) in the first nine months of year of 2004 at 3 key provinces, namely Binh Dinh, Phu Yen and Khanh Hoa in the central seawaters of Viet Nam, more than 10 thousand tones of bigeyes tuna had been landed. The highest product was caught 4,150 thousand tones by local fishermen at Phu Yen province. However, the augmented yield is not balanced with the number of fishing boats increasing. For example, during 1999 till 2003, 8% of fishing boats enlarged but only 3% of tuna products rising annually. [The Agricultural on-line internet of Viet Nam, 2004]. This signal might warning the tuna overexploiting situation at the distribution seawaters. There are some

measured data in relation to the landed tuna at several local markets had been collected in Viet Nam in previous years:

The skipjacktuna (*Katsuwonus pelamis*) is one of the important commercial species for Vietnamese captured fishery. Previous studies on skipjack tuna in Vietnam have been conducted since 1960's. The key fishing grounds of this species are Central and Southern seawaters in any season.

Notably, the skipjacktuna caught by gillnet accounted for 49-69% in the offshore seawaters. Additionally, some studies on biological characteristics; distribution, feeding activities have primarily been carried out [ALMRV, 2003].

Large Yellowfin tuna typically associate with several species of dolphin. Tuna purse seine fishers take advantage of this association by finding the dolphin at the surface to locate the tuna beneath them. That is the reason why tuna and dolphin are caught together in the same purse seine nets. The tuna and dolphin are herded and captured together in the net but prior to retrieving the entire net and the tuna, the captain and crew attempt to release the dolphin by calling as "backdown", while using various dolphin safety gear. It is clear that dolphin are not the target species, but only an incidental catchment. After several training courses, organized by MoFI, fishermen pulled nets backing a backward direction and then sank nets downward to release dolphin out of nets. It has been evident that dolphin and tuna, normally moved as accompanies in tropical seawaters [Dave & Martin H., 1996]. The real reason is not known but there is a relationship between dolphin-tuna. It causes to incidental catch of dolphin in tuna fishing nets. According to local fishermen's experiences pointed out that the appearance of dolphin, it seems, tuna is able to come.

5. Current sea turtle status related to fishing operation:

There is much information related the accidental catchment of sea turtles. Sea turtles regularly move from coastal waters to open seas and migrate from one region to another depending on the season or their age, meaning that they interact with a range of different kinds of fishing activities.

For high-seas longline fisheries, like those targeting swordfish and various tuna species, which have a distribution that overlaps the migration routes and feeding grounds of several turtle species, The FAO consultation discussed the use of new kinds of fishing gear to prevent by-catch such as new hook types and smarter fishing to help other endangered species.

There had been some incidental catchments caused death of sharks, dolphin, turtles and seabirds ... by using that J-hook style [MoFI, 2004].

Normally, almost all tuna fishing boats have been using the J-hook style, which hang down the longline nets. Each longline net has a length less than 2 Km with 500 to 600 hooks. One fishing boat often carries more than one longline net during the tuna fishing season.

- 15 coastal provinces in Vietnam have recorded or acknowledge incidental catch
- Dramatic declines in the past 10 years in the number of nesting female sea turtles nation-wide
- Total incidental catch estimated amount of one hundred turtles per year
- Reports of incidental catch during the breeding and nesting season at key foraging areas still limited.

Table 3: Sea Turtles impacted by fishing gear operations in Vietnam (Based upon 2,347 questionnaire feedback during 2003-2005)

Species	Gillnet	Bottom trawl	Longlines	Drift nets
Green	Y	Y	Y	Y
Hawksbill	Y	Y	Y	Y
Olive Ridley	Y	Y	Y	Y
Loggerhead	Y	Y	Y	Y
Leatherback	Y	Y	Y	Y

Gear modifications and application related to “Circle hooks” for longline fisheries need to control other experimental variables (e.g. type of bait, fishing areas, level of effort, number of hooks used, etc. however some fishermen do not want to use larger hooks. It is considering the use of “TEDs” Turtle Exclude Devices for trawl fisheries but requires greater incentives as well as “FADs” Fish Aggregative Devices techniques and skills. In addition, an option such as seasonal or area closures and “Smart” fishing techniques (i.e. regularly lifting nets to release sea turtles) need to be developed. The reduction of fishing boats, it means reduction for inshore reduction and offshore expansion under MoFi Fisheries Master Plan, which was approved.

However, for all gear mentioned above, the question laying out is:

- What about the costs of replacing gear? (TEDS especially expensive)
- Community needs re-assurances that any loss of catch will be compensated (so therefore also need good baseline data on average catch rates before new gear implemented)
- Also requires a socio-economic assessment of the impacts of new regulations and capacity/resources to develop alternative income measure.

A number of simple measures have already proven helpful in reducing by-catch in tuna longline

fisheries, including the use of “circle hooks” in place of traditional “j-style” hooks. Circle hooks are not easily swallowed by sea birds and turtles and reduce the probability that turtles get hooked accidentally. More careful selection of bait to avoid those favored by turtles, greater attention to the depth at which hooks are set and to the bait “soak time” can also help.

CONCLUSION AND RECOMMENDATION

Viet Nam has actively protected marine resources and promoted responsible and sustainable exploitation.

It also addresses biodiversity issues and conservation of endangered species and minimizes the catch of non-target species. It was also asked to assist governments in assessing fisheries interactions and putting appropriate management measures in to place, which often lack the technical capacity or financial resources needed to undertake such work for sea turtle. However, it need implementing is:

- The pilot using of circle hooks in longline.
- The modification of other fishing gear and methods.
- Selective use of fishing gear.
- More research to prevent by-catch.
- Enhance local public knowledge, with education and training programs.

Obviously, it will be a long process, as it will be necessary to promulgate the national laws and regulations, as well as to reach agreements among nations on the sustainable and responsible use of marine resources at the high seas. The current interest of the government of Viet Nam, through the Ministry of Fisheries (MoFi), is to promote the tuna resource exploitation and preservation has become permanent.

The Law of Fisheries of Viet Nam, officially enforced since the first July, 2004. This Law is clear that the current existing legislation and direct fishing policy based upon the scientific evidence available, with diversified locally participation in terms of the current tuna exploitation and preservation of sea turtle resource in the South China Sea. There are some appropriate direction have to tracking down, including:

- Catching in the deeper water-layers instead of swallower waters.
- The need for more research in modifying fishing gear and methods to prevent by-catch - such as altering the depth at which hooklines are set or using different types and sizes of hooks.
- Use circle hook and step reducing number of J-hook style. Use selective fishing gears both netting mesh-size and length to reduce the incidental catchments, of sea turtles and other, such as sharks, turtles, seabirds.

- Enhance locally public knowledge concerned to local fishermen, such as local captain, technical crews, labor mechanism...
- Boats should promptly release any accidentally caught sea turtles, always carrying with them the necessary equipment for doing so.
- In long-line fisheries, combinations of hook design, bait types, fishing depths, gear specifications and fishing practices should be used to minimize accidental deaths of endangered species.
- Plans to avoid loss of nets and retrieve drifting nets and fishing gear, which can harm turtles, should be developed in all fisheries.

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